The Future of 4.9 GHz

WT Docket No. 00-32

July 1, 2004

NPSTC
and
Cisco Systems
Tropos Networks
Nortel Networks
PacketHop, Inc.

Purpose of the Meeting

Make a case for Reconsideration Order

1. Approve mask A at or below 20dBm

2. Defer decision on mask above 20dBm until more information on operational performance for masks A and C becomes available

Goal

- **Provide cost-effective mission-critical broadband services to Public Safety leveraging standards-based COTS technologies**

Urban 802.11 Coverage

Extended Coverage

Coverage From Pole-Top APs
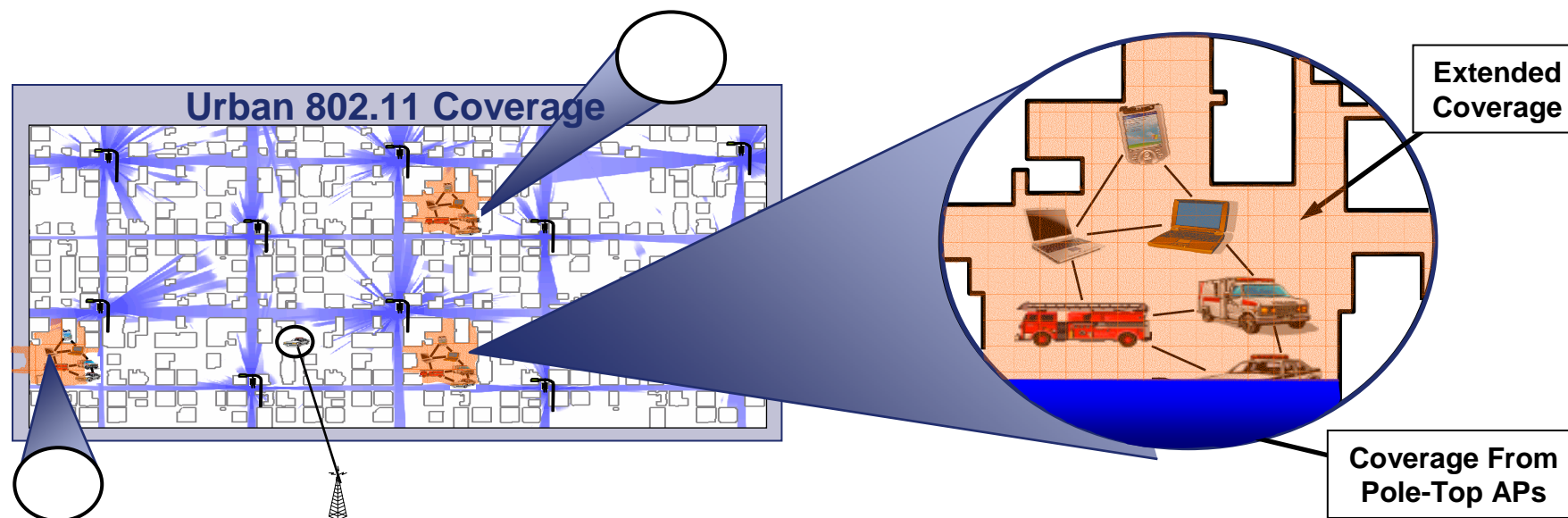
- **802.11 infrastructure deployments are expanding beyond traditional "hot spots" and are being deployed across entire metropolitan areas in a cellular-like manner**
- **Client devices running mesh networking software are able to complement pre-placed infrastructure and extend the network and the services offered to users**

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Public Safety Already Embracing 802.11

- Los Angeles, CA PD: 27 WLANs at police stations throughout the city (pop. 3.8 million)
- Columbus, OH PD: linked city PD to surrounding PDs (pop. 711,500)
- New Orleans, LA PD: police surveillance (pop. 484,700)
- Aurora, CO PD & FD : 300 mobile police and fire units (pop. 300,000)
- Syracuse and Onondoga County, NY PD: (pilot) (pop. 164,000)

- San Mateo, CA PD: metro scale, WiFi mesh network (pop. 92,500)
- Buffalo Grove, IL PD: patrol cars & mobile incident command (pop. 42,900)
- North Miami Beach, FL PD: metro area network (pop.40,800)
- Post Falls, ID PD: 23 access points with up to 5 mile radius; 22 patrol cars (pop. 20,000)
- Isle, MN PD: 7 member police force equipped with 802.11b (pop. 700)

Competitive Market Forces

- **Open standards-based, commercial wireless networking technology is proven and exists from a multitude of vendors**

- **Large vendor community and competition breeds innovation**

  - **Expanded capabilities such as IEEE 802.11e, i, n, r, s**

- **Competition promotes competitive prices**

- **End-users can be creative and use new technology and applications as they become available (e.g., PDAs, VoIP over WLANs)**

Public Safety Can Benefit From Standards

- **Public Safety should not require specialized radio product for broadband**

- **Public Safety will significantly reduce the supplier community if it requires a specialized solution where it is the only market interested in such products**

- **Public Safety would benefit from the rapid innovation and standards being driven by much larger markets for 802.11**

Public Safety cannot assume it will have competitive suppliers if it requires a specialized solution – vendors will simply choose not to supply to this market

802.11 Promotes Efficient Spectrum Usage

- **Common radio with a single mask operating in 4.9-5.9GHz bands benefits public safety communications**

  - Common mask for multiple frequencies enables band manager to move non-critical communications to UNII band

  - If Mask C is required, this multi-band capability and flexibility cannot happen

- **Transmit power control promotes frequency reuse**

- **Listen-before-talk promotes efficient band sharing**

- **Capable of automatically selecting clear channel**

- **Interference results in lower data rates, <u>not complete loss of service</u>**

Technical Considerations

- Suitable mask should be decided based on operational performance for packet data systems

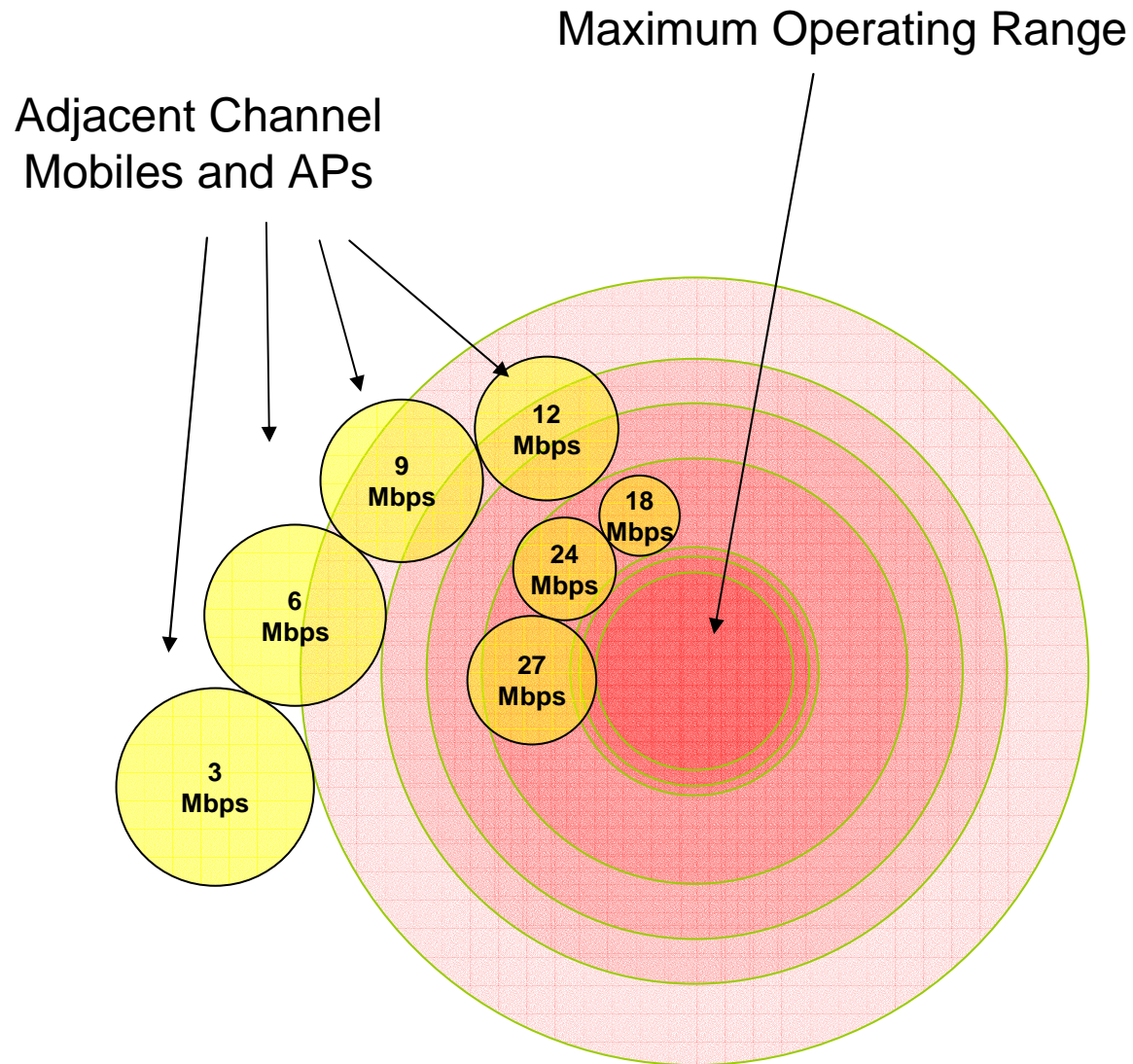- 802.11 masks are proven to be commercially successful worldwide

Mask Comparisons - 10 MHz Channel Bandwith
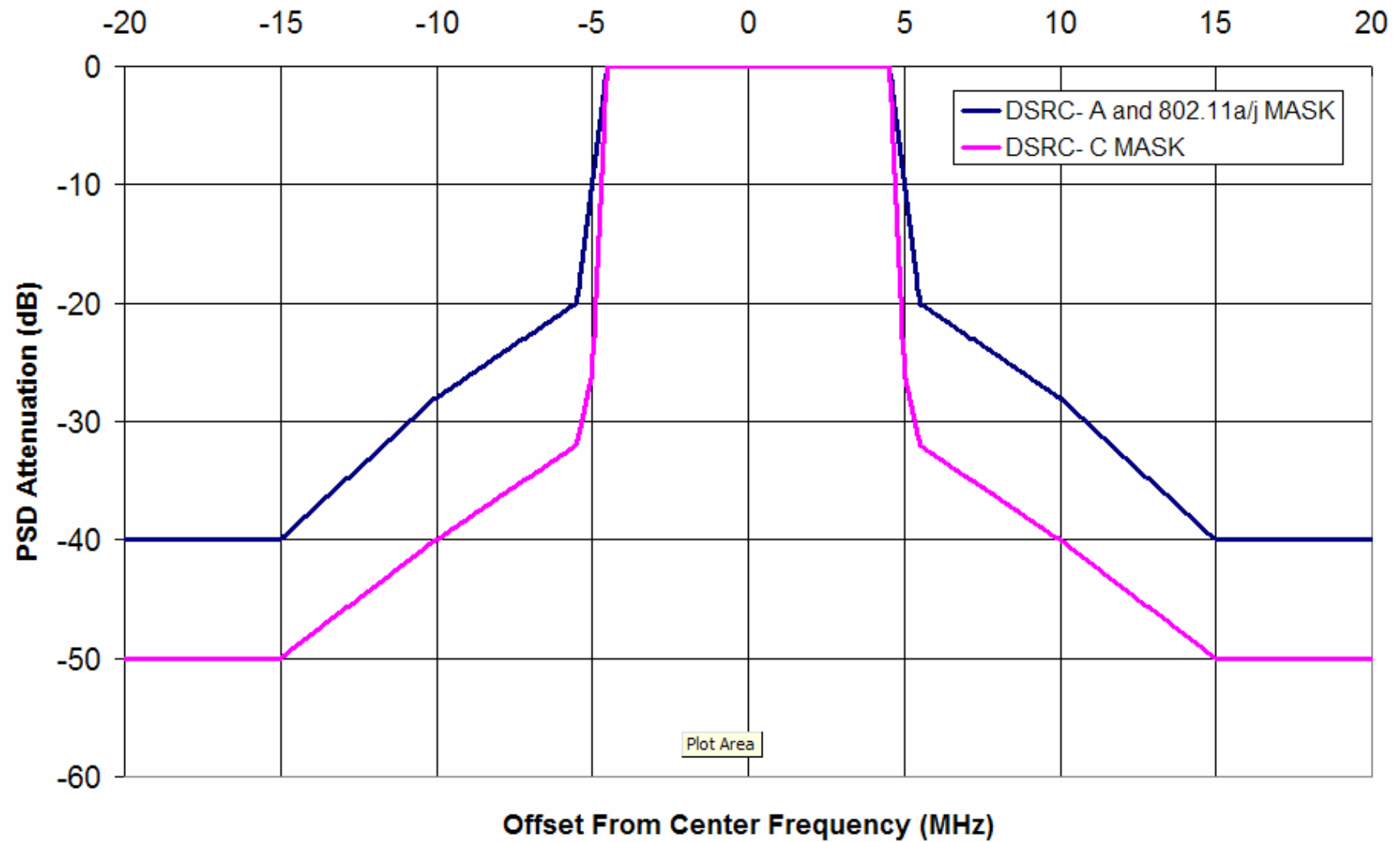
Adjacent Channel Effects

- **Concurrent unrelated operations in adjacent channels in the same place are unlikely and can be managed**
  - **Single AP hot spots: No adjacent channel interference**
  - **Pre-installed infrastructure: Channel use is already coordinated**
  - **Isolated APs coming together: Will be administratively managed**

- **Specialized user needs for additional adjacent channel protection can be met by enhanced receiver performance, as already provided in DSRC standard, instead of constraining all transmitters in this band**

- **A mask will support same fixed reuse pattern as C mask**

- **Use of high gain directional antennas with higher power nodes reduces interference further**

- **In IP-based systems, interference results only in reduced throughput (Ex: WLANs)**

Communications and Interference Ranges – 10 MHz DSRC/802.11j

Maximum Operating Range

Adjacent Channel
Mobiles and APs

12 Mbps

9 Mbps

18 Mbps

24 Mbps

6 Mbps

27 Mbps

3 Mbps

Values are to scale

Data Rate (Mbps)	Desired Range (m)
3	422
6	335
9	287
12	228
18	133
24	123
27	106

Data Rate (Mbps)	Interference Range (m)
3	106
6	97
9	87
12	77
18	43
24	55
27	69

Out Of Band Emissions

Adoption of mask A will <u>not</u> impact out of band emissions

Prompt FCC Action Required

- **Time is of essence**
  - Public safety community is issuing numerous RFPs for mobile broadband services
  - Vendor community needs quick decision for participation
  - Helps RPCs to develop realistic service plans and band usage plans
  - Implementation of currently available wireless broadband technologies quickly enables advanced Homeland Security applications

- **Issue a Reconsideration Order expeditiously**
  1. Approve mask A at or below 20dBm
  2. Defer decision on mask above 20dBm and allow experimental licenses above 20dBm to gather more information on operational performance for masks A and C